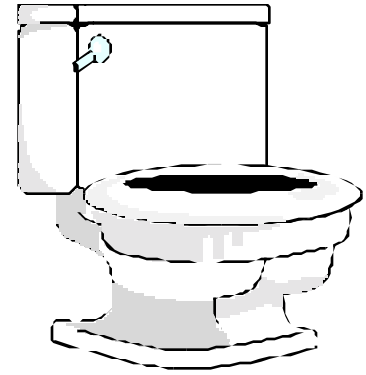


SUPER BOWL SURGE

Objectives:

Using this Project WET activity, students will:

- illustrate how demands on some treatment plants cause overflow,
- explain problems with sewage overflow,
- propose solutions to a water management problem,
- recognize how presentation strategies influence public policy.



Materials:

- Tokens or popcorn, etc
- Cups
- A bucket or other container
- Copies of pages that follow
- Chalk

Procedure:

Part I:

1. Ask the students if they watch the Super Bowl or a favorite special program that a large group would watch. Ask them what they do during halftime or a commercial! Tell them they will be participating in a demonstration showing what happens to wastewater treatment systems when unusually large numbers of people flush at once.
2. Draw a T on the floor with chalk. Have pairs of chairs facing each other along the long part of the T. (The sewage pipe is buried along this chalk line.) Have the students sit in chairs (each chair represents a house). Have two students stand at the cross of the T. (These students are the treatment plant with the river behind it.)
3. Each chair gets a cup of popcorn representing waste materials.
4. Tell the students that 5 seconds are required for the plant to clean the waste from each house. One student from the end of the T collects the popcorn while the other counts to 5. Only one piece of popcorn may be collected every five seconds.
5. Have the students sitting in the chairs each count off from one to four. When you call "Flush!" and a number (1,2,3,or 4), students of that number should pick up one piece of popcorn, walk to the treatment area, standing at arm's length from the person in front of them.
6. When a student gets to the treatment plant, they give the popcorn to the plant and return to their home (chair). This is repeated for all of the people with the number called. If all of the students have their waste treated in one minute, the system does not overflow. Call out "Flush, one" for an example. Do this several times.
7. Now call, "Flush, one, two, three, four." All students will move to the pipe, standing arm's distance away from the previous person. It takes 5 seconds for each person to deposit the popcorn, so all will not be complete in one minute. (If you have fewer than 12 people in your class, modify the time limit to 15 or 30 seconds.) The system has backed up. Tell the students still waiting to drop their popcorn behind the two treatment plant people and return to their seats. This represents untreated sewage that

goes directly into the river. Look at how much is there compared to how much was treated.

8. Have all students return to their seats and discuss their reactions. Are there times when many people flush their toilets at once? Ask them what problems might arise from untreated sewage being dumped directly into a water source. Responses might be: odorous water; tainted water leading to health hazards for wildlife, domestic animals, and people (bacteria, viruses, and protozoa in sewage can end up in the water and get into the intestinal system of humans and other animals; waterborne diseases like dysentery and hepatitis are transmitted by contaminated water); single-celled organisms take up too much oxygen if they are concentrated so regular plant and animal life cannot survive.

Part II:

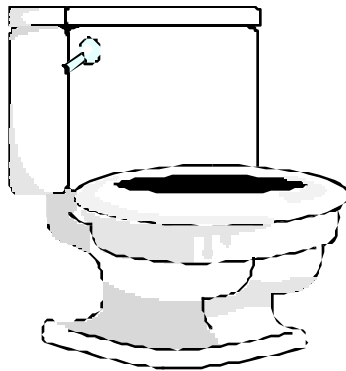
1. Divide the class into four groups and give each a copy of *Treatment Plant Braces for "Super Sunday" Surge* and the *City of Beavertown Request For Proposals*. Tell each group that they are consulting teams and that each group will prepare a report that includes a proposed solution.
2. Teams must consider the following:
 - A description of the problem and why it concerns the community (health hazards, environmental impacts, etc)
 - Individuals or groups in their community who would be affected by untreated water flowing into the river (birdwatchers, health department, farmers, US Environmental Protection Agency, wildlife, treatment plant, cities downstream, economic impacts, etc)
 - Details of the effect of sewage overflow on one or more community groups. (Have each team think about a different group. This is their sponsoring team.)
 - A recommended action plan for solving the potential overflow problem. The plan must address related environmental, economic, and social issues, including a report on the potential impact of sewage overflow on the community groups.

Discuss:

- Who will be affected?
 - How will the plan ensure that community members will cooperate?
 - What will be the cost?
 - Who will pay?
 - How will they pay?
 - How much is each resident willing to pay?
4. Have guest teachers, principal, and/or parents visit the classroom to be on the evaluating board. Or have each team select a member to create the board that evaluates all of the plans.
 5. Each team will present their report and solution in a 5-minute proposal to the class. Provide each team with a copy of the *Supplemental Form*.
 6. Teams can be given any length of time to prepare (minutes, days, week, etc)
 7. Have teams discuss the decision making process. For more information, request a sewage flow graph from a local treatment plant. Notice peaks on the graph. When did they occur?

Treatment Plant Braces for “Super Sunday” Surge

Beavertown—While most of America eagerly anticipates the National Football League (NFL) Championship game, water treatment plant operators at the City of Beavertown’s Nutria Creek Plant dread “Super Sunday.” Each year during the game, at each commercial break and at halftime, a surge of wastewater rushes into the sewer system, creating a real “super bowl” at the plant. Nutria Creek operators jokingly refer to this phenomenon as the “rush to flush”, but they quickly add that the sewer surge poses serious health, environmental, and economic problems. “Last year we crested at 41 mgd. [million gallons a day] at half time,” said plant superintendent Chuck “Red” LeSewer. “This plant was designed to handle a maximum of 40 mgd – it was a miracle we didn’t have an overflow. A raw sewage overflow into nearby Nutria Creek and Beaver River would create a serious health, environmental, and economic disaster to the community. The Cascadia Department of Environmental Health has required the City of Beavertown and the Beaver River Water Authority Board to design a solution to the potential raw sewage overflow problem. The city and the board have asked for consulting teams to examine the problem and propose solutions. The Nutria Creek Plant was constructed by the city in 1977, when the sewer district’s service population was 75,000. Today, more than 125,000 residents live in the district. Population growth, and an aging collection system may require the city to increase capacity, at a cost of up to \$40 million. The city and sanitary-sewer rate-payers hope the consulting teams will be able to propose a less costly alternative.



City of Beavertown Request for Proposals (RFP)

Potential “Super Sunday” Sanitary Sewer Surge

Background:

The City of Beavertown is soliciting professional consultation to collect information and make recommendations regarding potential sewage overflow problems associated with professional football contests and other major social events.

City engineers have determined that during times of high water usage, the capacity of Beavertown’s sanitary sewer system and wastewater treatment plant is nearly exceeded. This “rush to flush” phenomenon is particularly acute during halftime and at commercial breaks during the Super Bowl, as well as during Thanksgiving Day, and New Year’s Day televised sports events. To a lesser extent, this surge of sanitary sewage also occurs daily between the hours of six and nine in the morning.

The Cascadia State Department of Environmental Health has determined that this potential raw sewage overflow problem poses a serious health threat, as well as a threat to the environmental, and economic well being of the Beaver Creek Basin.

The Facilities:

The City of Beavertown Public Works Department provides sanitary sewer service for the urban portions of the Beaver River Basin. The city operates Nutria Creek Wastewater Treatment Plant, which serves 50,000 homes and businesses in the basin. Nutria Creek plant provides secondary treatment for a maximum flow of 40 million gallons per day. The effluent is discharged to the Beaver River. The Nutria Creek plant was constructed in 1977 to serve a projected population of 125,000 residents (54,000 homes and businesses).

Scope of Work:

Qualified consulting teams will conduct surveys of potential affected parties, collect information on the proposed alternatives, and present recommendation solutions to the Beaver River Water Authority Board of Directors. (BRWAB)

Criteria:

Proposed solutions to the potential overflow problem should be comprehensive and creative, and should address the concerns of all affected parties. Consulting teams should consider the environmental as well as economic costs and benefits of each proposed solution.

Consulting teams will be judged on completeness, feasibility, creativity, and clarity of their presentations, and on the expected results of proposed solutions. Teams will also be judged on their overall presentation skills, teamwork, and study habits. Audio/visual and poster presentations are encouraged.

Timeline:

Consulting team recommendations are due for presentation to the BRWAB within

Supplemental Form
City of Beavertown RFP

Name of consulting team/firm: _____ Date: _____

Name of community group sponsoring team: _____

Description of problem, including its effect on the team's sponsor (attach additional pages if necessary).

Proposed action plan (attach additional pages if necessary).

Signatures: _____	Duties: _____
_____	_____
_____	_____
_____	_____

.....
For Board Use Only:

Criteria used to evaluate the plan: feasibility, expected results of proposed solution, clarity, effort, presentation style, etc. Assign each criterion a specific number of points, not to exceed a total of 75 points.

For Teacher Use Only:

Study habits, cooperation, thoroughness, teamwork, etc. 25 points

